CLAIMS

What is Claimed is:

1. A protocol selection matrix adapter for interfacing a host computer to multiple in-vehicle networks on a vehicle through a plurality of protocols, said adapter comprising:

a protocol central processing unit (CPU) circuit, said CPU circuit providing vehicle network protocol interactions, low level filtering of incoming messages, data and communications transfer to the host computer, time stamping and broadcast functionality operations;

a universal asynchronous receiver transmitter (UART) decoder circuit for decoding UART protocols; and

a plurality of transceivers, said transceivers providing a protocol interface between the vehicle and the host computer, wherein the adapter is capable of providing simultaneous support of at least two vehicle protocols.

2. The adapter according to claim 1 wherein the adapter operates in a plurality of modes, including a vehicle configuration mode where the host computer configures the adapter to the vehicle, a stand-alone data collection mode where the adapter collects data from an in-vehicle network, a data upload to the host computer mode where the adapter uploads data collected from the vehicle to the host computer, and a pass-through mode where data and other information from an in-vehicle network passes directly from the vehicle to the host computer through the adapter.

3. The adapter according to claim 1 wherein the adapter supports each of the following protocols:

SAE J1850, Ford Standard Corporate Protocol (SCP);

SAE J2284, Dual-wire Controller Area Network (CAN) Protocol;

ISO 9141 Ford, UART Protocol;

ISO 9141-2, CARB UART Protocol;

Key Word Protocol (KWP) –2000;

Ford Data Communications Link (DCL) UART Protocol;

Ford UART Based Protocol UBP; and

Nissan Diagnostic Data Link (DDL) UART Protocol.

4. The adapter according to claim 1 where one of the plurality of transceivers is a controller area network (CAN) transceiver for providing a CAN protocol interface between the vehicle and the host computer.

5. The adapter according to claim 4 wherein the CAN transceiver includes a high-speed mode transceiver and a medium-speed mode transceiver.

6. The adapter according to claim 1 wherein one of the plurality of transceiver circuits is a standard corporate protocol (SCP) transceiver circuit for providing a SCP protocol interface between the vehicle and the host computer.

7. The adapter according to claim 6 wherein the SCP transceiver circuit

includes a two wire differential protocol each having an output coupled to a resistor.

8. The adapter according to claim 1 wherein one of the plurality of transceiver circuits is a UART based protocol (UBP) transceiver circuit that is controlled by the UART decoder circuit, said UBP transceiver circuit providing a UBP protocol interface between the vehicle and the host computer.

9. The adapter according to claim 1 wherein one of the pluralities of the transceiver circuits is a data communications link (DCL) protocol that is controlled by the UART decoder circuit, said DCL transceiver circuit providing a DCL protocol interface between the vehicle and the host computer.

10. The adapter according to claim 1 wherein one of the plurality of transceiver circuits is an ISO 9141 transceiver circuit that is controlled by the UART decoder circuit and supports all ISO 9141 type protocols in key word-2000.

11. The adapter according to claim 1 wherein one of the plurality of transceiver circuits is a diagnostic data link (DDL) UART transceiver circuit that is controlled by the UART decoder circuit, said DCL transceiver circuit providing a DCL protocol interface between the vehicle and the host computer.

12. The adapter according to claim 1 wherein the UART decoder circuit employs five UART based physical layers, including UBP1/UBP2, DCL, DDL, 9141 Ford

and ISO –9141.

13. The adapter according to claim 12 wherein the UART decoder circuit employs two quad bus buffered gate integrated circuits to route UART communications between the CPU circuit and the five UART based physical layers.

14. The adapter according to claim 1 further comprising a program voltage circuit for controlling the voltage of the adapter, said program voltage circuit including a voltage pump that outputs a voltage signal to a digital-to-analog converter, said converter being interfaced to the CPU to produce a programming voltage within a predetermined range.

15. The adapter according to claim 1 wherein the CPU circuit employs a background debug mode connector that programs a flash memory.

16. The adapter according to claim 1 further comprising two first-in/first-out memory circuits providing a host data read and a host data write between the adapter and the host computer.

17. The adapter according to claim 1 wherein the adapter reprograms electronic control units within the vehicle.

18. A protocol selection matrix adapter for interfacing a host computer to

multiple in-vehicle networks on a vehicle through a plurality of protocols, said adapter comprising:

a protocol central processing unit (CPU) circuit, said CPU circuit providing vehicle network protocol interactions, low level filtering of incoming messages, data and communications transfer to the host computer, time stamping and broadcast functionality operations;

a universal asynchronous receiver transmitter (UART) decoder circuit for decoding UART protocols; and

a plurality of transceivers, said transceivers providing a protocol interface between the vehicle and the host computer, wherein the adapter is capable of providing simultaneous support of at least two vehicle protocols, said plurality of receivers including a controller area network (CAN) transceiver for providing a CAN protocol interface between the vehicle and the host computer, a standard corporate protocol (SCP) transceiver circuit for providing a SCP protocol interface between the vehicle and the host computer, a UART based protocol (UBP) transceiver circuit that is controlled by the UART decoder circuit, said UBP transceiver circuit providing a UBP protocol interface between the vehicle and the host computer, a data communications link (DCL) protocol that is controlled by the UART decoder circuit, said DCL transceiver circuit providing a DCL protocol interface between the vehicle and the host computer, an ISO 9141 transceiver circuit that is controlled by the UART decoder circuit and supports all ISO 9141 type protocols in key word-200, and a diagnostic data link (DDL) UART transceiver circuit that is controlled by the UART decoder circuit, said DCL transceiver circuit providing a DCL protocol interface between the vehicle and the host

computer.

19. The adapter according to claim 18 wherein the adapter operates in a plurality of modes, including a vehicle configuration mode where the host computer configures the adapter to the vehicle, a stand-alone data collection mode where the adapter collects data from an in-vehicle network, a data upload to the host computer mode where the adapter uploads data collected from the vehicle to the host computer, and a pass-through mode where data and other information from an in-vehicle network passes directly from the vehicle to the host computer through the adapter.

20. The adapter according to claim 18 wherein the UART decoder circuit employs five UART based physical layers, including UBP1/UBP2, DCL, DDL, 9141 Ford and ISO –9141.